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Optimising Financial Reporting: A Lean Management and RPA Approach for EU Life-Funded Projects

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ABSTRACT:

Efficient and accurate financial reporting is crucial in today's fast-paced business environment. However, the case company has been relying on manual labour to produce the necessary project financial reports. With the rapid pace of technological advancements, the objective of this master thesis is to investigate how this process can be optimised to reduce manual labour and ensure the highest quality financial reports.

The study was conducted as a case study, and the data collection method used was interviews and evaluation of internal process documentation. Based on the gathered data, the current state of the financial reporting process was evaluated, identifying areas of inefficiency and potential for improvement with the help of Lean Management and Robotic Process Automation tools and theory.

The Lean Management theory can significantly improve the efficiency of a process by minimising waste. Combining Lean Management and Robotic Process Automation can eliminate the waste of human capital by reducing repetitive human tasks. When humans are taken out of these repetitive tasks, the quality of the work improves, especially in tasks like retrieving data from multiple software systems. As a result of the study, a new process was developed, with Robotic Process Automation at its centre, made possible by streamlining and standardising the process.

To summarise, this research provides a comprehensive understanding of the obstacles in the existing financial reporting system for EU Life-funded projects and proposes an innovative solution. By utilising the potential of RPA and Lean Management principles, it creates a path towards a future where financial reporting is not only streamlined but also reliably precise, satisfying the expectations of both internal stakeholders and external sponsors.

KEYWORDS: Financial reporting, Robotic Process Automation (RPA), Lean Management, EU Life financial reporting, Process Optimising

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ABSTRACT:

Tehokas ja tarkka taloudellinen raportointi on nykypäivän nopeatempoisessa liiketoimintaympäristössä ratkaisevan tärkeää. Tapausyrityksessä on kuitenkin luotettu manuaaliseen työhön tarvittavien projektin talousraporttien tuottamisessa. Teknologian nopean kehityksen myötä tämän opinnäytetyön tavoitteena on tutkia, miten tätä prosessia voidaan optimoida manuaalisen työn vähentämiseksi ja korkealaatuisten talousraporttien varmistamiseksi.

Tutkimus toteutettiin tapaustutkimuksena, ja tiedonkeruumenetelmänä käytettiin haastatteluita ja sisäisten prosessidokumenttien arviointia. Kerättyjen tietojen perusteella arvioitiin talousraportointiprosessin nykytilaa ja yksilöitiin tehottomuusalueet ja parannusmahdollisuudet Lean Management- ja Robotic Process Automation -työkalujen ja -teorian avulla.

Lean Management -teorian avulla voidaan merkittävästi parantaa prosessin tehokkuutta minimoimalla hukka. Yhdistämällä Lean Management ja robottiprosessien automatisointi voidaan poistaa inhimillisen pääoman tuhlausta vähentämällä toistuvia työtehtäviä. Kun ihmiset poistetaan näistä toistuvista tehtävistä, työn laatu paranee, erityisesti sellaisissa tehtävissä kuin tietojen hakeminen useista ohjelmistojärjestelmistä. Tutkimuksen tuloksena kehitettiin uusi prosessi, jonka keskiössä on robottiprosessien automatisointi ja joka mahdollistui prosessia virtaviivaistamalla ja standardoimalla.

Yhteenvetona voidaan todeta, että tässä tutkimuksessa annetaan kattava käsitys EU Life -ohjelmasta rahoitettujen hankkeiden nykyisessä talousraportointijärjestelmässä olevista esteistä ja ehdotetaan innovatiivista ratkaisua. Hyödyntämällä RPA:n ja Lean Management -periaatteiden tarjoamia mahdollisuuksia siinä luodaan tie kohti tulevaisuutta, jossa talousraportointi on virtaviivaistettua ja luotettavan tarkkaa ja täyttää sekä sisäisten sidosryhmien että ulkoisten rahoittajien odotukset.

KEYWORDS: Financial reporting, Robotic Process Automation (RPA), Lean Management, EU Life financial reporting, Process Optimising

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ABSTRACT:

Effektiv och noggrann finansiell rapportering är avgörande i dagens snabbt föränderliga affärsmiljö. Trots detta har fallföretaget förlitat sig på manuellt arbete för att framställa nödvändiga projektfinansiella rapporter. Med den snabba teknologiska utvecklingen är målet med denna magisteruppsats att undersöka hur denna process kan optimeras för att minska manuellt arbete och säkerställa finansiella rapporter av högsta kvalitet.

Studien utfördes som en fallstudie och metoden för datainsamling var intervjuer och utvärdering av intern processdokumentation. Baserat på insamlad data utvärderades det nuvarande tillståndet i processen för finansiell rapportering, och områden med ineffektivitet samt förbättringspotential identifierades med hjälp av verktyg och teorier inom Lean Management och Robotic Process Automation (RPA).

Teorin om Lean Management kan signifikant förbättra effektiviteten i en process genom att minimera slöseri. Genom att kombinera Lean Management och RPA kan slöseri med mänskligt kapital elimineras genom att reducera repetitiva manuella uppgifter. När människor tas bort från dessa upprepade arbetsuppgifter förbättras arbetskvaliteten, speciellt i uppgifter såsom att hämta data från flera mjukvarusystem. Som ett resultat av studien utvecklades en ny process med RPA i centrum, möjliggjord genom att förenkla och standardisera processen.

Sammanfattningsvis ger denna forskning en omfattande förståelse för hinder i det nuvarande systemet för finansiell rapportering för projekt finansierade av EU Life-programmet och föreslår en innovativ lösning. Genom att utnyttja möjligheterna som RPA och principerna för Lean Management erbjuder skapas en väg mot en framtid där finansiell rapportering inte bara är effektiviserad utan även pålitligt noggrann, vilket uppfyller förväntningarna hos både interna och externa intressenter.

KEYWORDS: Financial reporting, Robotic Process Automation (RPA), Lean Management, EU Life financial reporting, Process Optimising

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Abbreviations

EU – European Union
LA – Lean Automation
RPA – Robotic Process Automation
VSM – Value Stream Mapping

1 Introduction

This master's thesis studies Lean Thinking and Robotic Process Automation (RPA) as transformative tools for modern business processes. Lean thinking is rooted in the principles of maximising value and minimising waste. The research was undertaken as a case study. The primary objective was to develop a process to enhance overall operational efficiency while delivering value to stakeholders. It offers an exhaustive analysis of the present operational process and pinpoints areas for optimisation. This research was commissioned by the case company.

1.1 Background of the study

The case company in question is a state-owned enterprise with approximately 1 150 employees. The case company's primary responsibility is to manage state-owned land and water areas. The company primarily focuses on the sustainable management of natural resources, including forests, national parks, and wilderness areas. This involves various activities, such as monitoring, research, and conservation efforts, to ensure these resources are used and developed responsibly and sustainably. (Case Company, 2021)

As part of conservation efforts, the company also participates in externally financed projects, where the European Union EU Life program is its leading external financier (interview). The EU Life is the European Union's flagship initiative that has been crucial in promoting environmental and climate action (*LIFE Programme: More than €290 Million in EU Funding for Nature, Environment and Climate Action Projects**, 2021). EU Life projects are usually big projects and, therefore match with case companies' strategy to move towards bigger environmental protection and conservation projects. Therefore, the new strategy is to prioritise EU Life projects over different externally financed projects (Interview). By leveraging external funding and partnering with other organisations, the case company can contribute to broader environmental goals while fulfilling its core mission of sustainable resource management. (Case Company, 2021)

The first Life program was established in 1992. After that, there have been six different Life programs since 1992. EU Life has funded over 5,500 projects to date, making it an essential tool for environmental and climate action for the European Union. The objective of the EU LIFE project is to contribute to the implementation of EU environmental and climate policy to achieve a sustainable future for the continent. (*LIFE Programme: More than €290 Million in EU Funding for Nature, Environment and Climate Action Projects**, 2021)

The current LIFE program, active until 2027, has a budget of 5.45 billion EUR and is divided into four sub-programs: Nature and Biodiversity, Circular Economy and Quality of Life, Climate Change Mitigation and Adaptation, and Clean Energy Transition (*History of Life*, n.d.). These sub-programs aim to address the key environmental and climate challenges, promoting sustainable development and improving the quality of life for EU citizens (*History of Life*, n.d.). With the LIFE project, the EU is ensuring a wide range of stakeholders are working together to achieve the shared environmental and climate goals and contributing to building a greener and more sustainable Europe for future generations.

The external financier reporting is made by a team of 4 persons. This team consisted of 5 project financial administration specialists. Now, the team has been reduced to 4 persons, and in the near years, it will be reduced to 3 due to retirements. Therefore, there is a need to study their work process to evaluate if it is possible to streamline the process to enable successful work with a smaller team than historically has been needed.

The revenue generated from EU Life projects represents only a small portion of the company's overall revenue. Consequently, the current invoicing and worktime tracking software needs to be tailored to meet project reporting requirements. To address this issue, the study will focus on identifying solutions that enable seamless integration of the company's existing software systems while also serving the needs of the project reporting team more effectively.

1.2 Aim of the study

The objective of this master's study is to develop the process for financial reporting for EU Life-funded projects. This study will only process the financial reporting for EU Life-funded projects. The end goal of this study is to increase the effectiveness of the process and eliminate non-value-adding work.

The study's central research question is "How to develop a leaner financial reporting process?" In support of this research question, the study will also investigate the following sub-research questions:

- Which parts of the reporting process can benefit from Robotic Process Automation (RPA) to streamline the process?
- What aspects of the process add value to the financial reporting?
- Which parts of the process are non-value-adding tasks?

By answering these research questions, this study aims to develop and improved financial reporting process for EU Life-funded projects that is more effective, efficient, and valuable.

1.3 Structure of the study

This master thesis is divided into four main chapters that present an analysis of the development of the financial reporting processes for EU Life-funded projects. Chapter 1 introduces the background of the study and the case company. It's also giving context to the challenges associated with financial reporting in EU Life-funded projects. Chapter 2 presents the theoretical framework with a focus on Lean Management and Robotic Process Automation (RPA). Chapter 3 chapter outlines the research methodology and data

collection techniques used in the study. It also highlights the data analysis methods and procedures.

Chapter 4 presents the case study in detail to streamline the process. Through this detailed presentation, as a result it's suggested a solution where RPA is combined with Lean management principles to streamline the process. Finally, in Chapter 5 the conclusion of the study is discussed by answering the research questions.

2 Theoretical Framework

Justin Trudeau's 2018 statement, "The pace of change has never been this fast, yet it will never be this slow again" (*Leading in a Time of Disruption*, 2022), underscores the rapid transformations impacting every facet of businesses. Given this backdrop, it's essential for company management to consistently evolve their processes, ensuring they harness the full potential of available tools. Even in this dynamic environment, Lean management remains a pivotal methodology. Its core principle of waste reduction ensures processes are both swift and reliable. (Jadhav et al., 2014)

In the realm of emerging technologies, Robotic Process Automation (RPA) stands out as a game-changer. As highlighted by researchers like Madakam, Holmukhe, and Jaiswal, RPA autonomously manages tasks, from payroll handling to invoice verification. The integration of RPA not only accelerates these tasks but also enhances accuracy. When paired with advanced technologies such as AI, the scope of RPA in refining financial reporting expands further. (Jadhav et al., 2014)

2.1 Lean

Lean thinking is a methodology that started in the mid-1900s in the Japanese car industry, focusing on eliminating waste and improving efficiency. The lean concept was introduced in the 1990s by International Motor Vehicle Programs research at MIT. Today, the vast majority of car manufacturers have adopted lean manufacturing techniques. While lean thinking initially developed in the manufacturing sector, it has since been applied to the service industry and other support services, such as financial administration. (Paterson, 2015, p5-10)

There are countless definitions of lean, with as many definitions as there are articles written about it. Niklas Modig and Pär Åhlström conducted a survey in Sweden, asking 63 lean professionals from 14 different industries to define lean. The answers from the

survey could be divided into 17 categories. Some of the categories were values, waste elimination, philosophy, method, toolbox, production system, quality system, and more (Modig & Åhlström, 2013). This shows how wide of a strategy lean is and the importance of customising lean to serve your needs and process (Modig & Åhlström, 2013). However, if we attempt to identify the core values of lean, it could be delivering value to the customer, eliminating non-value-added tasks, and continuously improving.

It's common to divide Lean methodology into five key principles that help organisations streamline their processes and optimise efficiency.

Define Value

It begins with identifying value, focusing on understanding and meeting customer needs. This principle is crucial for ensuring that the products or services offered genuinely resonate with the customer's expectations, a concept deeply rooted in marketing fundamentals that emphasize the importance of results over products (Bicheno; Womack & Jones).

Map Value Stream

The second principle, mapping the value stream, extends beyond the identification of steps necessary for value delivery. It involves a thorough examination of all processes from concept to delivery, advocating for a holistic view that encompasses the entire supply chain. This perspective not only highlights critical value-adding activities but also exposes non-value-adding steps, paving the way for their elimination (Bicheno).

Create Flow

Creating a continuous workflow, the third principle emphasizes the importance of removing interruptions and ensuring that value-adding activities proceed unhindered. This principle is foundational for achieving a seamless flow of operations, thereby enhancing process efficiency (Womack & Jones).

Establish Pull

The fourth principle, establishing a pull system, shifts the focus towards demand-driven production. It underlines the significance of aligning production with actual customer demand, thereby minimizing waste associated with overproduction and excess inventory (Bicheno).

Pursuit Perfection

Continuous improvement, the final principle, encapsulates the ethos of Lean by advocating for an ongoing commitment to process refinement. This principle encourages organizations to remain vigilant in identifying inefficiencies, fostering a culture of perpetual growth and optimization (Olesen et al., 2015).

Incorporating these principles, Lean methodology offers a robust framework for organizations seeking to optimize their operations, reduce waste, and significantly enhance customer value.

Figure 1 RPA development model

Commonly, knowledge workers overlook the non-value-adding tasks that are involved in their work, such as waiting for decisions, responding to calendar invites, and requesting information (Staats & Upton, 2011). However, applying lean principles can help identify and eliminate unnecessary steps in the workflow, increasing productivity and reducing waste. This is particularly beneficial for knowledge workers who can streamline their processes, reduce the time and resources required to complete tasks and create time for more value-adding activities. Applying Lean principles to administrative processes can significantly reduce time, effort, and cost while improving quality and customer satisfaction, even though these processes do not directly generate revenue (Bradley, 2015, p. 19-20). Companies can achieve greater efficiency and cost savings by adopting Lean principles in administrative processes.

2.1.1 Muda

Muda is a Japanese term used to describe waste, which refers to any activity that adds no value to a product or service. It is a crucial aspect of Lean Management and a primary concept derived from the Toyota Production System (TPS). Identifying Muda is essential in pointing out non-value-adding activities within a process. These activities consume resources but do not contribute to the end customer's value, leading to unnecessary costs, delays, and reduced quality. It is important to identify these wasteful activities ingrained in processes to eliminate them and improve the overall efficiency and effectiveness of the system. (Womack & Jones, 2003, Part 1)

Muda refers to more than just physical waste. It covers a wide range of wasteful activities and inefficiencies that can occur in any organisational process. It provides a way to analyse and refine operations, with the goal of creating a more efficient, streamlined, and customer-centric workflow. Eliminating Muda is not just about cost-cutting, but also about optimizing value creation, improving customer satisfaction, and fostering a culture of continuous improvement and efficiency. (Bicheno & Holweg, 2020, Chapter 2.6)

Taiichi Ohno, a prominent figure in the development of Lean Manufacturing, originally identified seven types of Muda in the TPS. These seven types have since become a benchmark in Lean practices across various industries, guiding organizations in their pursuit of operational excellence. The first step in eliminating these forms of waste is to identify them, which requires a keen understanding of the process flow and a commitment to ongoing assessment and refinement. Furthermore, an eighth type of waste was later added to acknowledge the importance of human factors in process optimization, which focuses on underutilized human talent. This addition highlights that Lean is not just a set of tools and techniques but also a philosophy that values human potential and creativity. (Peter L. King, 2019, Cahpter 3)

By understanding and addressing the various types of Muda, organizations can significantly enhance their processes, reduce costs, and increase their competitive advantage. The elimination of Muda is a journey towards creating a lean, agile, and highly responsive organization, capable of delivering the highest value to its customers with minimal waste. (Peter L. King, 2019, Chapter 3)

1. Waste of overproduction
2. Waste of waiting
3. Waste in transportation
4. Waste of overprocessing
5. Waste of inventory
6. Waste of movement
7. Waste of defects
8. Wase of Human Capital

(Peter L. King, 2019, Chapter 3)

Waste of overproduction

Producing more than what is needed is a waste of resources, as excess inventory takes up space, increases costs, and can become obsolete. Overproduction can result in a loss of focus on meeting customer needs and lead to poor quality due to rushed work or neglect. The Lean approach aims to reduce overproduction by implementing a pull system, where production is based on customer demand, and by improving production flow through value stream mapping. (Peter L. King, 2019, Chapter 3)

Overproduction is often deemed the most serious waste as it encompasses additional waste and can mask inefficiencies within the processes. In manufacturing, overproduction leads to increased storage needs and a heightened risk of product obsolescence. In administrative work tasks, overproduction consists of overproducing not needed reports or gathering unnecessary data into reports (Raghunathan et al., 2016). Tackling overproduction requires not just a transition to a pull system but also a robust understanding of customer demand patterns and a flexible production system capable of adapting quickly. Techniques such as Just-In-Time (JIT) production and Total Quality Management (TQM) are essential in addressing this waste.(Bicheno & Holweg, 2020, Chapter 2)

Waste of waiting

Waiting is a key form of waste within processes, where resources remain idle, awaiting decisions, information, or the initiation of activities. This idleness breeds inefficiencies, disrupting operational flow. In manufacturing, this often appears as operators waiting for machinery or vice versa. Reflecting on Toyota's early principles, situations where operators awaited machinery were considered disrespectful to the operator's time and capabilities (Bicheno & Holweg, 2020, Chapter 2). Similarly, in administrative tasks, the waste of waiting emerges from delays caused by waiting for emails, enduring lengthy meetings, dealing with slow computer systems, or facing other barriers that prevent tasks from being completed promptly (Skhmot, 2017). These delays create bottlenecks,

complicating the timely completion of financial reports. The impact of such delays is far-reaching, potentially leading to missed opportunities and affecting decision-making effectiveness.

To combat this waste, Lean principles suggest enhancing process efficiency, minimizing batch sizes, and cultivating improved communication channels among employees and departments. These strategies are pivotal in diminishing lead times, bolstering productivity, and elevating customer satisfaction, bringing financial reporting processes into closer alignment with Lean's core objectives. (Peter L. King, 2019, Chapter 3)

Waste in transportation

Transportation waste involves the unnecessary movement of people, tools, inventory, equipment, or products, which can extend beyond what is essential for the process. Such excess movement not only risks damage and defects to materials but also contributes to unnecessary wear and tear on equipment and can cause fatigue among personnel.(Bicheno & Holweg, 2020, Chapter 2)

In office settings, the principle of minimizing transportation waste suggests that team members who frequently collaborate should be positioned close to one another to facilitate easier communication and collaboration (Skhmot, 2017). Similarly, in manufacturing environments, materials needed for production must be readily accessible at the point of use. This accessibility helps in avoiding the inefficiency and potential quality issues arising from double or even triple handling of materials.

Waste of overprocessing

Overprocessing, involving unnecessary steps and the use of resources beyond what customers truly need, is a significant inefficiency within both manufacturing and administrative domains(Bicheno & Holweg, 2020). In manufacturing, it can be the use of overly

precise equipment, unnecessary product features, or excessive quality checks that do not align with customer values. In administrative settings, it surfaces through the creation of overly detailed reports, redundant approval processes, or the unnecessary duplication of data processing efforts (Wijnhoven et al., 2016). These activities not only consume valuable time but also divert resources from tasks that genuinely add value.

To address overprocessing, a deep understanding of customer expectations is crucial. Streamlining each process step to ensure it directly contributes to fulfilling these expectations without surplus is essential (Skhmot, 2017). By adopting the customer's viewpoint from the outset, maintaining the required quality standards, and producing strictly what is needed, organizations can effectively minimize the waste associated with overprocessing, thereby enhancing operational efficiency and productivity.(Bicheno & Holweg, 2020)

Waste of inventory

Inventory waste occurs when there is surplus inventory, binding capital and obstructing resource flow, potentially leading to obsolescence or loss. This type of waste is subtle in administrative work, it can be visible as uncompleted work or as customers await service, mirroring the material excess in manufacturing where components linger unused. Often, this arises from an overcollection of data or documents due to misjudging their immediate or future utility, resulting in redundant archives and cluttered data storage.(Wijnhoven et al., 2016)

This type of waste can be reduced by implementing a pull system to ensure inventory levels align with actual demand, thereby streamlining production flow and fostering improved inter-departmental communication and collaboration. This approach not only reduces the physical waste of materials but also mitigates the less tangible, yet critical, waste of information overflow. (Peter L. King, 2019, Chapter 3)

Waste of movement

Waste of movement within processes occurs when employees engage in unnecessary actions that don't add value to the end product or service. In manufacturing settings, this often involves an inefficient layout that forces employees to traverse greater distances than necessary, leading to time wastage and increased fatigue, thereby diminishing productivity. (Peter L. King, 2019, Chapter 3)

In office work, the waste of movement spans both physical and digital domains. Digitally, it encompasses the time and energy expended searching for and transferring information across unconnected systems, necessitating redundant manual entry or data reconciliation (Wijnhoven et al., 2016). Physically, it manifests as unnecessary walking to communicate with colleagues or excessive searching through inventory to locate necessary materials (Skhmot, 2017).

To enhance process efficiency, eliminating these non-value-adding movements is critical. Adopting integrated systems and optimizing workspace layout can significantly reduce motion waste. This contributes to streamlining operations, ultimately fostering a leaner, more effective working environment., Chapter 3(Peter L. King, 2019)

Waste of defects

Defects emerge when products or services fail to meet established customer criteria, necessitating rework, generating waste, or precipitating customer discontent. This recurrent issue spans the gamut of manufacturing and administrative activities. In manufacturing, identifying defects during quality control is preferable, as it minimizes cost and disruption. However, defects noticed by customers after delivery can escalate costs significantly and damage trust and satisfaction.(Bicheno & Holweg, 2020, Chapter 3)

Administratively, defects are often represented by inaccuracies in data entry, processing errors, or the distribution of incorrect information. These lapses lead to inefficiencies as additional effort is required to rectify them. Commonly, these defects arise from deficiencies in information processing or customer inputs. The fallout from such administrative lapses can delay critical decisions, erode stakeholder confidence, and potentially result in financial anomalies that affect an organization's fiscal standing and regulatory compliance. (Wijnhoven et al., 2016)

Waste of human capital

Human capital waste occurs when employees are not fully engaged, and their skills, knowledge, and creativity are not utilised. This type of waste can be addressed by creating a culture of engagement and empowerment, providing opportunities for training and development, and involving employees in problem-solving and process improvement initiatives. By tapping into the full potential of employees, organisations can improve productivity, quality, and innovation. (Peter L. King, 2019, Chapter 3)

2.1.2 Value Stream Mapping (VSM)

Value Stream Mapping (VSM) is a popular lean management tool. It enables businesses to evaluate their process operations, information flows, and data processes by creating a visual diagram of the process from the beginning to the end. This map is used to identify value-adding and non-value-adding work, providing businesses with a detailed understanding of their processes in action (50 Minutes, 2017, Theory).

By pinpointing non-value-adding work, VSM highlights opportunities for improvement and optimisation, allowing businesses to focus their efforts on streamlining and optimising the value-adding activities and to strive to achieve real value-adding processing time. This means process time without any lead times brought on by bottlenecks or delayed

decision-making. Whether it's the entire lifecycle of a product or just one specific procedure, VSM can be used to develop and optimise processes. (Manos, 2006)

To be able to identify value-adding work and non-value-adding work, it's necessary to clarify what value-adding work and non-value-adding work mean.

Value-adding work refers to any process, step, or activity that directly contributes to creating or delivering a product or service that effectively meets the needs or desires of a customer. This type of work is essential for successful completion and adds value to the final product or service. (50 Minutes, 2017, Theory)

Non-value-adding work refers to any activity or process step that does not add value to the product or service (50 Minutes, 2017, Theory). This type of work is often considered wasteful or unnecessary and can include activities such as waiting, transporting, reworking, or overproduction. Non-value-adding work can lead to inefficiencies, delays, and increased costs for businesses, which is why it is important to identify and eliminate it wherever possible using tools like VSM. (Contras & Byrne, 2022, Chapter 1)

Steps for creating VSM

1. Identify product group
2. Identify the current state map
    a. Material flow
    b. Information flow
    c. General symbols
3. Observe and confirm the process
4. Creating future state map
5. Creating the implementation plan

(Shahriar & Chowdhury, 2017, p12-19)

2.1.3 Kaizen

Kaizen, a cornerstone of lean philosophy originating from Japan, embodies the concept of continuous improvement. This approach emphasises making small but steady advancements at every level of the organisation. Where the goal is to foster a culture where all employees actively participate in the ongoing betterment of the organisation. (Cortiglioni et al., 2020, Chapter 13)

The principles of Kaizen revolve around continuous small improvements, identifying root causes of issues, promoting teamwork, standardisation, and visualisation. By encouraging employees to suggest improvements, experiment with new ideas, and implement changes in their work practices, Kaizen aims to enhance efficiency, quality, commitment, and overall organisational performance. (Cortiglioni et al., 2020, Chapter 13)

Adaptable to all types of organisations and industries, Kaizen empowers an organisation to refine its operations continuously, ensuring it remains competitive in a dynamic and ever-changing business environment. By embracing Kaizen, organisations can drive sustainable growth and foster a culture of excellence. (Cortiglioni et al., 2020, Chapter 13)

2.1.4 Process standardisation

Standardisation is a critical component of Lean management. As Taiichi Ohno famously said, "There is no Kaizen without standards." Despite its significance, it is one of the most underutilised tools in Lean management (Mlkva et al., 2016). Some stakeholders may argue that standardisation is impossible for their non-repetitive tasks, especially in office environments, but this is a misconception. In reality, most process steps can be standardised in some way, including documentation and testing. Standardising error-prone or tedious tasks can be particularly advantageous (Eakin, 2020, Chapter 13).

Standards act as a clear starting point for all improvement efforts and set ambitious goals for organisations to pursue in their pursuit of continuous improvement. By standardising operations and work procedures, individuals can easily adapt to new tasks or train new employees. This also creates a foundation for generating new improvement ideas. By adhering to established standards, organisations can reduce errors, waste, and expenses while also enhancing quality and efficiency. Standardisation supports continual improvement, enabling workplaces to adapt and evolve without disrupting operations, resulting in better performance and greater adherence across the system. (Jackson, 2017, p. 13-26)

2.2 Robotic Process Automation (RPA)

Organisations striving for efficiency and cost-effectiveness must strike the right balance between automation and manual labour. One key consideration when deciding what to automate is whether the benefits of increased efficiency outweigh the costs of developing and implementing automation. While building a custom software system for automation is ideal for tasks that impact multiple teams and users, the costs and time involved can be significant when developing new software for organisations. Automating smaller team tasks with a custom software system may not be feasible due to the low number of human hours involved and the high investment costs required. Here is where RPA offers an agile automation solution. (Tripathi, 2018, p. 6-14)

RPA is a software technology that is designed to automate tasks by mimicking human actions in the user interface (UI). RPA can read, write, and click within existing systems and software, making it easy to implement without significantly disrupting daily operations. One of the main benefits of RPA is its ability to reduce costs significantly. According to McKinsey, RPA can generate an impressive ROI of up to 200% in the first year. RPA improves efficiency by automating repetitive and rules-based tasks, freeing employees to focus on more complex and creative tasks. (Lhure, 2016)

RPA also offers integration capabilities across different software platforms that are not fully integrated. This allows companies to automate tasks that would otherwise require manual intervention, improving data accuracy and reducing the risk of errors. For instance, RPA can be used to automatically transfer data between a company's invoicing software to multiple excel sheets, streamlining workflows and enhancing overall performance. (IBM)

The ability for RPA to integrate across different software platforms makes it a versatile and flexible automation solution that can be customised to meet the unique needs of different companies and industries. By leveraging RPA technology, companies can achieve significant cost savings, increase operational efficiency, and enhance their overall competitiveness in the marketplace.

When starting a new RPA project, it's important to have a detailed holistic view of the task that is going to be automated with RPA software. Mamede et al. divided the proses into a six-step RPA development model illustrated in figure 2. The RPA Development model begins with the identification and collection of processes suitable for automation, focusing on those that are consistent, template-driven, and rules-based. After analysing the gathered processes, one is selected for automation, typically the one offering the highest benefits when automated using RPA. A feasibility analysis is then conducted to ensure the benefits of automation outweigh the investment costs and that the impact on the organisation, employees, and clients is positive. This is followed by Process Reengineering, which involves a high-level analysis of the process solution to assess automation efficiency and estimate the required effort. Upon receiving project approval, a detailed study of the selected process is undertaken, leading to the definition of functional documentation and the project plan, followed by the construction and testing of the robot. Finally, the developed robot is implemented, with the acknowledgement that the duration of the Project can vary based on the complexities of the selected processes and their business contexts. (Mamede et al., 2023)

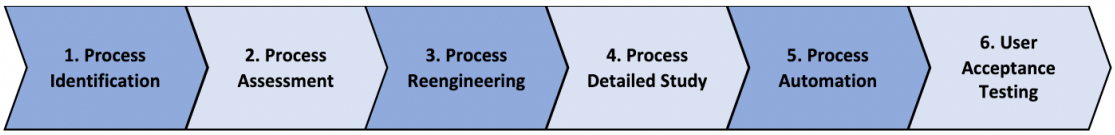

Figure 2 **RPA development model** (Mamede et al., 2023)

2.2.1 Why and when to use RPA

"Boring jobs lead to tedium which leads to errors which results in undesirable consequences. Eliminating swivel chair work is good for the employee and the company." (DeAngelis, 2017) . Swivel chair work refers to repetitive manual work that involves transferring data from one software system to another. This type of work can lead to employee dissatisfaction, errors, and decreased productivity. Fortunately, RPA is well-suited to automate such unnecessary manual labour, freeing up employees to focus on more meaningful and rewarding tasks. By automating swivel chair work, companies can improve employee satisfaction and productivity while also reducing the risk of errors and the associated costs of remediation. (DeAngelis, 2017)

One of the main advantages of RPA is that it requires low IT knowledge to configure automation robots, making it accessible to non-technical employees who can learn to program RPA with just a few weeks of training (Tripathi, 2018). Implementing RPA can save time and money while improving data quality, and its quick and agile implementation is another reason for its widespread use. The low IT requirement enables employees who perform the tasks to program the RPA tools for their team and work tasks.

RPA is particularly useful for high-volume and repetitive tasks that are rule-based and can be standardised. By automating these types of tasks, companies can reduce errors and improve efficiency, allowing employees to focus on more value-added activities.

Ultimately, the decision to implement RPA should be based on the specific needs and goals of the organisation.(Doguc, 2019, p.470-473)

2.3 Lean and RPA

The integration of Lean management and RPA is highly effective. Lean management provides an excellent framework for process improvement, while RPA enables the implementation of these improvements. The benefits are mutual, as a well-developed VSM and standardised process descriptions in Lean management provide a solid foundation for RPA development models. VSM and process descriptions offer a comprehensive and detailed overview that can be utilised in the first three steps of RPA development models, which include process identification, assessment, and reengineering. (Mamede et al., 2023)

One of the most evident applications of RPA in Lean management is the reduction of waste. RPA has the ability to eliminate waste in all eight types of muda, as demonstrated in Table 1 created by Mamede et al. By automating manual labour, time is saved, and resources are freed up to focus on tasks where skills and time are better utilized. Ortmeier et al. (2023) study supports this by developing a system to evaluate the effectiveness of RPA in administrative processes, specifically targeting waste elimination. Their framework involves mapping existing workflows, integrating RPA, and monitoring performance metrics like time savings and error rates, ensuring effective and efficient RPA implementation (Ortmeier et al., 2023). According to the findings of the Bexim & Teixeira study, the time saved from implementing RPA in the KPI calculation process was used to analyze the KPI results, which improved their process. Additionally, employee satisfaction increased. (Gradim & Teixeira, 2022)

Table 1
Eight Wastes of Lean associated with situations RPA can avoid.

Lean Waste	Examples RPA ameliorates
Transporting	Data flowing between different departments/systems needs to be more consistent.
Excess Motion	Moving exceedingly to process data between systems/platforms.
Waiting	Stopping workflow waiting for an answer from another department, to be able to finish one determined process.
Overproduction	Workers performing activities that aren't necessary at the moment.
Unnecessary Inventory	Keeping unused documents in the system.
Over Processing	Workers repeating activities, due to previously done errors, or lack of quality in the processing (e.g. missing details); Duplicate work, due to re-entering the same data in the system.
Defects	Processes with similar workflows producing somehow different outcomes.
Skills	Mechanical and rule-based tasks, with zero cognitive actions; Under-utilization of provided tools and systems.

Table 1 Eight Waste of Lean that RPA can avoid (Mamede et al., 2023)

2.4 Industry 4.0 and RPA

Industry 4.0 represents the fourth industrial revolution and is characterised by the integration of smart technology in manufacturing environments. It encompasses the use of modern smart technology in manufacturing environments, aiming to increase the level of automation, improve communication and monitoring, and enhance production efficiency. Industry 4.0 is marked by the emergence of technologies like the Internet of Things (IoT), cyber-physical systems, cloud computing, cognitive computing, and artificial intelligence. (Sanders et al., 2016)

Robotic Process Automation (RPA) is a great tool for managing and combining the vast volumes of data generated in an Industry 4.0 environment. RPA bots are capable of performing tasks such as data extraction, processing, and analysis quickly and accurately, enabling real-time decision-making and responsiveness in manufacturing processes. This automation of data-driven tasks not only enhances operational efficiency but also allows human resources to focus on more strategic, creative, and value-adding activities, fostering innovation and competitive advantage.(Gradim & Teixeira, 2022)

Lean Automation (LA) is the combination of Lean production practices with Industry 4.0 technologies, to enhance operational performance (Tortorella et al., 2023). Former

research, such as the study by Rossini et al. (2022), has shown a positive correlation between LA and operational performance (Rossini et al., 2022). LA has six objectives: low costs and reusability, high degree of reliability, simplicity and compactness, worker-machine fit, engagement of workers, and fostering a supportive culture (Vlachos et al., 2023).

RPA is flexible and quick therefore it allows for quick adaptation to changing market demands and operational conditions, ensuring the resilience and sustainability of manufacturing systems. The combination of Lean and RPA can be classified as Lean Automation because they share common goals, including the elimination of waste, enhancement of process efficiency, and improvement of operational performance. The integration of RPA with other Industry 4.0 technologies, such as IoT and AI enables the development of intelligent automation solutions that can learn, adapt, and optimise processes autonomously, paving the way for the future of smart manufacturing.

3 Methods of the study

This study explores how to improve the financial reporting processes for projects in the case company with RPA. Previous studies have explored how RPA can be used in accounting and invoicing processes, which are also related to financial reporting. However, the case company reporting process is complicated due to the many stakeholders and multiple software that are in use ending up in multiple manual labour steps. The study was commissioned by the case company.

3.1 Research Approach and Methods

A single case study was chosen for the method because it allows an in-depth examination of a specific process (Heale & Twycross, 2018). This study examined the case companies' financial reporting process. The data collection methods were interviews with employees of the case company and the case company's internal documents.

The study used both unstructured interviews and semi-structured interviews. Both interview types are qualitative data collection methods. An unstructured interview resembles a natural conversation and does have little structure, making it suitable when the interviewer aims to discover new information from the person being interviewed (Leavy, 2020). Semi-structured interview incorporates both open-ended and specific questions. This dual approach allows the interviewer to discover new topics that arise, while also ensuring certain areas of interest are addressed (Mueller & Segal, 2015). This combination is advantageous for guiding the conversation to predefined topics while leaving room for additional discovery and elaboration based on the participant's responses.

All of the interviews were analysed using thematic analyses based on interview notes. Thematic analysis was chosen because it provides a flexible yet systematic approach for identifying, analysing, and spotting themes within data (Braun & Clarke, 2006). The interview notes were analysed based on the theme of the interview, key observations were

categorized based on the process steps and tools that were mentioned as challenging by the interviewees. Markers of difficulty and inefficiency were systematically identified and were used as a basis for evaluating which aspects of the process or which specific tools required improvements. By mapping the frequency and context of each identified theme across the interviews, it was possible to prioritize areas for improvement.

3.2 Research Data and Data Analysis

Research data was gathered by interviewing different stakeholders in the case company and searching for internal documentation regarding the financial reporting process. The most crucial research data was the conducted interviews, the interviews were divided into two phases. Phase one was interviews to gain an understanding and visualize the current process and phase two was to find the areas that can and need to be improved.

The two first interviews in phase one were unstructured interviews with the team lead and the Director of Projects at the case company. The aim was to comprehensively understand the existing financial reporting process, pinpoint significant pain points, and present the software tools in use within the organization. These early interviews set the research direction and scope by facilitating an open dialogue about the challenges and expectations of the project. These interviews took 1 hour per interview. Unstructured interviews were chosen to gain as much background information about the current process. The interview notes were thematically analyzed and the highlighted themes were the overarching procedures in the financial reporting process and the software that were used in the different process steps.

The other 8 interviews in the first phase were semi-structured interviews average interview took 1 hour. Six of the interviews were held with the team lead and two were held with the Director of Projects. The subject of the interviews was to document in detail the financial reporting process, based on the interviews a VSM was produced for the current state of the process.

After completing the current Value Stream Mapping (VSM), the second phase of interviews started, which aimed to identify various developmental needs within the existing process. This phase began with three semi-structured interviews with team members from the financial reporting department. The objective was to delve into the daily challenges and inefficiencies encountered by the team. The semi-structured nature of these interviews provided the flexibility necessary to allow a natural exploration of topics as they arose, fostering a deeper understanding of issues. These interviews were analysed using thematic analysis based on the interview memos. The process included a comparison of the memos taken from each interview. Key observations were categorized based on the process steps and tools that were mentioned as challenging by the interviewees

Further insights were gathered through interviews two interviews with the Director of Projects, one interview with the Group Business Controller, and one interview with the Business controller these interviews were thematically analyzed based on interview memos.

Alongside interviews, an analysis of internal documents was conducted. The documents were analyzed using Document analysis. The internal documents analyzed were documents regarding the financial reporting process and the software that is used in the process. The document review was not just a supplement to the interview data but rather a substantial analysis of written representations of the software application and workflow.

Data	Format	Interviewee	Analysis
Interview 1&2	Unstructured interview	Team Lead & Director of projects	Thematical analysis
Interview 3-8	Semi structured interview	Team Lead	Thematical analysis
Interview 9&10	Semi structured interview	Director of projects	Thematical analysis
Interview 11	Semi structured interview	Team member #1	Thematical analysis
Interview 12	Semi structured interview	Team member #2	Thematical analysis
Interview 13	Semi structured interview	Team member #3	Thematical analysis
Interview 14	Semi structured interview	Director of projects	Thematical analysis
Interview 15	Semi structured interview	Director of projects	Thematical analysis
Interview 16	Semi structured interview	Group Business Controller	Thematical analysis
Interview 17	Semi structured interview	Business Controller	Thematical analysis
Interview 18	Semi structured interview	Team Lead	Thematical analysis
Internal documentation	Internal documents		Document analysis

Table 2, Table of analyzed data

4 Results

4.1 Current state

The first interview phase was designed to gain an understanding of the process with unstructured and semi-structured interviews to gain a holistic view of the reporting process. During the interviews, detailed explanations were provided by the interviewee on how each step of a process is executed, including the use of software and the construction and utilisation of Excel spreadsheets. Based on these interviews there where first a high-level process chart was made, seen in Figure 3, where the process is divided into four steps, Project approved, Operational, Financial reporting and Report submission

The first step in the project process chart is "Project approved," which includes when the case company's board of directors accepts the project proposal. At this stage, the financial administration specialist joins the Project and opens cost centre codes, among other tasks.

The second step is "Operational," which includes all the tasks performed by project managers and other stakeholders working on the Project. This includes filling out the timesheets, processing purchase invoices, and processing travel expenses.

The third step in the process chart is "Financial reporting," which represents the main phase of external financial reporting. This step involves extracting necessary financial data from multiple software systems and processing the data to update the reporting template.

The fourth and final step is "Report submission," which involves finalising all attachments for the report and submitting the report to the representative from the EU Life organisation. After the report is submitted, there may be requests for additional documentation or clarification from the EU Life organisation, which the financial administration

specialist must address. Once the report is accepted, the final payments are made to the case company, and the financial administration specialist can close the Project.

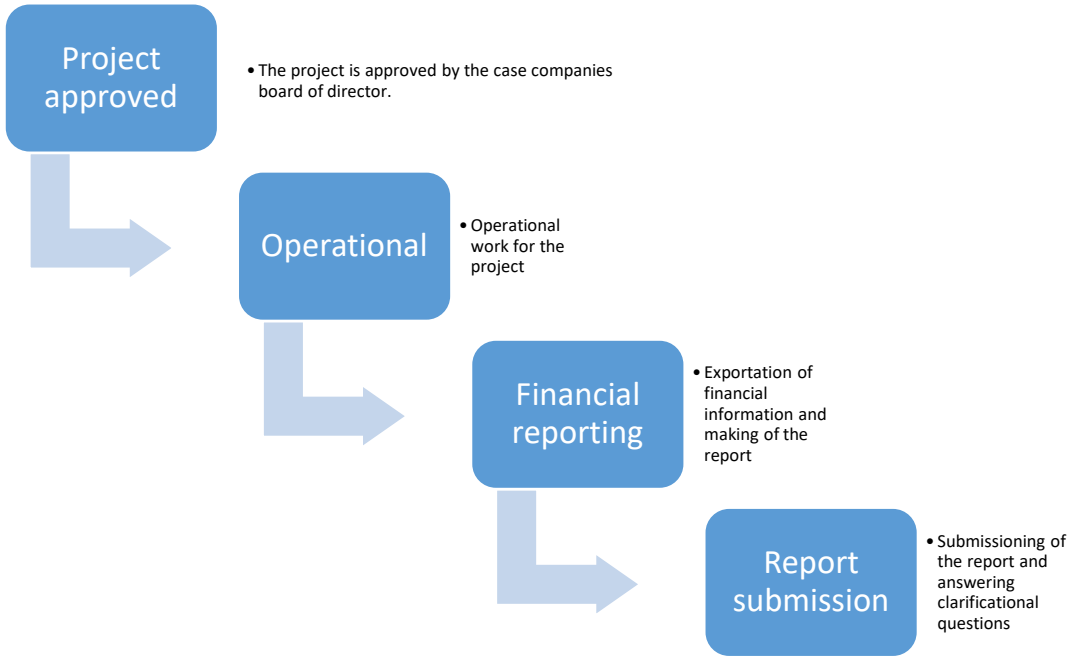

Figure 3 Process chart

4.2 Case companies software

The focus is placed on the software used throughout the process to gain a comprehensive understanding of the Project. Once a process chart is constructed, the next step is to introduce the software used in the reporting process to obtain a holistic view. Therefore, this section will provide an overview of the software utilised in the reporting process.

The case company's software has been designed to meet the diverse needs of the entire organisation of the case company. The information about the different software is collected from internal documents and conducted interviews. At the centre is SAP, which serves as the hub for most of the software used by the organisation. For processing

purchase invoices, Basware P2P is used, and for travel expenses Visma M2 is used. Recently they have purchased a software called SALKKU as a Project management software system for all projects. And the fifth software used is HELKA as the salary system.

SAP

The case company is using SAP S/4 HANA as the backbone software for the company's financials. Every software that the case company uses that is processing financial data as purchasing invoices, salary documents etc., is either importing data to SAP S/4 HANA or exporting the data from SAP S/4 HANA.

Basware P2P

The Case company utilises Basware's P2P system to process purchase invoices. The system is capable of handling both electronic and paper invoices, which are scanned and processed electronically. The P2P system facilitates the entire procure-to-pay process, including requisitioning, purchasing, receiving goods and services, and processing, verifying, allocating, and approving invoices.

Basware's P2P system integrates with SAP, transferring invoices seamlessly into the accounting system. The P2P system uses project codes for accounting, and invoices are sent for approval to the relevant cost centre before being processed by the accounting team. The system allows for efficient tracking of invoices and timely payment to suppliers through the use of a payment system that pays according to the due date, usually on Tuesdays and Thursdays.

Visma M2

The Case company utilises Visma M2 as their travel expense management software. The system includes various features such as travel expense claims, driver's logs, expense claims, document scanning, posting rules, and electronic approval processes.

The system allows different user roles with different permissions. For example, the employee can create and submit expense claims, while the manager can review, approve, or reject them. The finance department can handle reimbursements and generate reports.

When creating an expense claim for a trip, the user can add multiple expenses from the same trip, and for each expense, a receipt is required as proof of expense. This can be an electronic receipt as a PDF or a photo of a physical receipt. The system automatically calculates the user's daily allowance based on the travel location. Additionally, the user can also add travel compensation for using their car, according to the Tax Authorities.

Visma M2 is integrated with other financial administration systems such as SAP, Helka, and Nordea First card system. The PRR codes are also used in Visma M2, as they are used in Basware P2P.

SALKKU

SALKKU is the case company's specialised project management tool that is designed towards serve and helps the project manager of both external and internal financed projects. Every employee needs to add their working hours towards every Project in SALKKU.

HELKA

The case company uses Helka, a payroll software system that records employee salaries and benefits in their respective home cost centres. Helka enables the company to easily manage vacation pay, retirement fees, and other benefits. For projects, Helka facilitates the recording and transfer of salary costs and employee benefits using memory vouchers based on actual hours worked, as tracked by the system. Project salary and associated costs are then calculated following the funder's instructions.

4.3 Current process

After the first phased interviews and reviewing internal documents, a Value Stream Map (VSM) was created (as seen in Appendix 2 and figure 3) together with the team lead of the Financial Administration Specialists team to provide a comprehensive overview of the process. The process involves Project Managers, a Financial Administration Specialist, and a representative from the EU Life financier. The Financial Administration Specialist is the key stakeholder who utilises data inputted by Project Managers to generate the financial report, which is ultimately submitted to the EU Life representative. Each Project is assigned to a specific Financial Administration Specialist, who is responsible for overseeing the Project's financial reporting from start to finish.

The VSM was created based on the process chart to ensure all steps were included. Together with the Financial Administration Specialists team lead and group business controller, the VSM was created based on through interviews, email, and weekly meetings. The first step was to identify the process steps involved in reporting. Eight processes were identified as part of the financial reporting process. The next step was to connect each process to the appropriate software to gain an understanding of the software usage in each step. To ensure the VSM's accuracy, every member of the Financial Administration Specialists team was presented with it during their interviews, and they were given the opportunity to provide input. The final version of the VSM was created based on the feedback received from each team member.

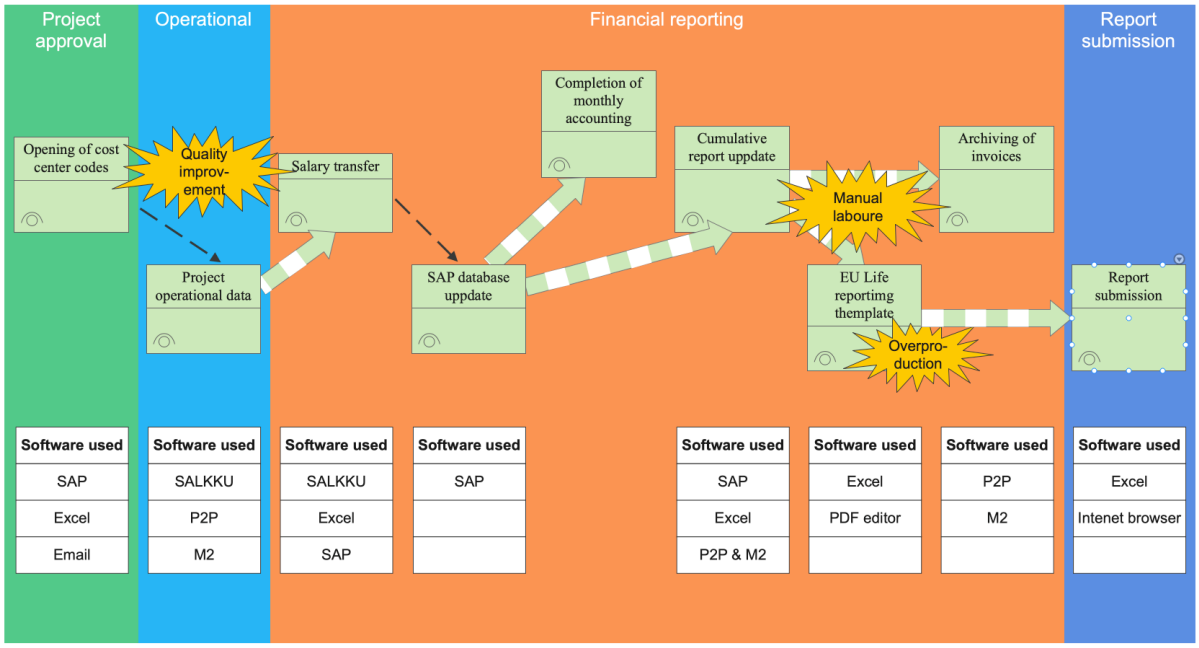

Figure 3 Current VSM

4.3.1 Opening project cost centre code

Opening a project cost centre code is the first step in the project financial reporting process. It involves a process where the project owner, or the project manager, applies for a PRR (Project Request and Registration) number. This is done once the Project has received its funding decisions.

The PRR code application is completed through an Excel form and then submitted to the project finance team for review. The project finance team then reviews the PRR code application and may ask for additional information to ensure that the PRR code is opened correctly. After this, a project code is opened in the SAP system. The project code requires several background details linking the Project to the company's financial system. The goal is to ensure that an approved budget is in place, funding decisions have been made, and any deadlines for using funds have been confirmed. This process ensures that the financing allocation to different functional areas associated with the PRR code is correct and controlled from the start.

Under the master cost centre code, each work package is assigned a unique cost code. Additionally, a separate cost code is assigned for each financier involved in the Project. Each financier cost code has a percentage value associated with it, which SAP then uses to balance the accumulated cost towards each financier automatically.

This process ensures that accurate financial reporting is maintained throughout the Project, allowing for better tracking of expenses and better decision-making in terms of resource allocation.

4.3.2 Payroll transfer in SAP accounting

The first step in the recurring monthly financial reporting process is to allocate salary costs to the respective Project's cost centre. This begins with exporting employee timesheets from the SALKKU software in the form of an Excel file after the employee's manager approves the timesheet. The timesheets are then updated with the employee's hourly rate, which is based on the actual expenses incurred from the previous year. The payroll department provides a list of hourly rates that contain the previous year's realised salary expenses for employees working on externally financed projects. If an employee's hourly rate is not listed in the Excel sheet, the financial reporter needs to request the rate from the payroll department by email. Once all the employee costs have been collected, the next step is to transfer the costs from the employee's department to the Project. This process ensures accurate Project cost accounting and helps organisations manage their finances efficiently.

4.3.3 SAP PS runs

The SAP PS runs take place on the first day of every month. The external financing reporting team has one main user in the SAP PS module who is responsible for running all the runs.

Before the SAP PS run can start, it is crucial to verify the accuracy of all account entries. This is done by exporting a report from SAP and saving it to an Excel file. The report is used to check that the PRR3 level matches the PRR2 level. Then the data is checked in Excel to ensure that the areas of activity are correctly marked. Once these steps have been completed, everything is ready for SAP PS runs.

SAP PS run is started by completing the overheads for each Project. There is a pre-built overhead model for each project type in the SAP PS module. Following the overhead allocation, the next step is to execute the decompression runs from PRR2 to PRR3. Once both runs have been completed, a final check is made to ensure that everything has gone correctly, and for this purpose, a focus report is run on the unloading runs. If APU RAHLA is 0, the unloading runs have been successful. The last step in the SAP PS runs is the printout runs, which are performed on the weekday morning after the unloading runs.

4.3.4 Updating the cumulative report for the Project

The next step in the process is updating the cumulative report for the Project. For this, the SAP report is manually exported separately for each cost centre. These reports are exported in Excel format. Once the reports have been exported, the next step is to manually update all the expenses and incomes to the Project's cumulative report. This is also in an Excel format that is saved on the database H. The cumulative report summarises all of the Project's financial data, including expenses, revenues, and other relevant information.

The cumulative report is updated every month. It is used for project managers and financial reporting to the company board.

4.3.5 Archiving of attachments

The next step in the process includes manually exporting and archiving each invoice associated with the Project. Every invoice is archived in the designated database H, as a PDF file. The invoices must be archived for at least two years after completing the Project. Basware P2P software used for billing and payment processing only keeps invoice archives for two years from the invoice date. When a project can take multiple years, there is a need for a longer archive than Basware P2P can deliver. This phase ensures that all project-related invoices are accurately recorded and accessible when needed.

4.3.6 Fill in the financier's financial report

Filling up the financier financial report is the following step in the project financial reporting procedure. Each financier has a unique financial report template available in Excel format. The necessary financial information for the Project must be manually copied and pasted into the report. To provide a clear and thorough overview of the Project's financial state, it is crucial to ensure all data is entered appropriately.

The financier reports are filled out at the end of a reporting period. The reporting period can range from one month to one year. The financier will pay out the grant according to the financial report, so it's essential to ensure that the submitted report is error-free to receive the right amount of grant payments.

4.3.7 Financial Report and Submission of Attachments to the Financier

The next step in the project financial reporting process is gathering all the required attachments requested by the financier. Salary statements, travel expense receipts, tax payment certificates, accident insurance certificates, pension payment certificates, and other administrative attachments are examples of these attachments. These attachments are collected from one SharePoint folder to streamline the process. Then all attachments must be manually integrated into a single PDF file. Once the financial report and all the documents have been assembled, they are electronically sent, typically through the financier's website.

4.4 Future process recommendation

The current VSM process was successful in identifying three development points in the financial reporting process. These development points are highlighted in yellow in Figure 3. The development points are Quality improvement in the recording of hourly and invoice data, Manual labour in the preparation of financial reports and overproduction in the completion of the EU Life form.

4.4.1 Manual labour updating the financial reporting

The most significant development in the financial reporting process relates to the manual labour that is put into producing the reports. Currently, the process involves eight steps, all of which are manual. These steps are illustrated in Figure 4 below.

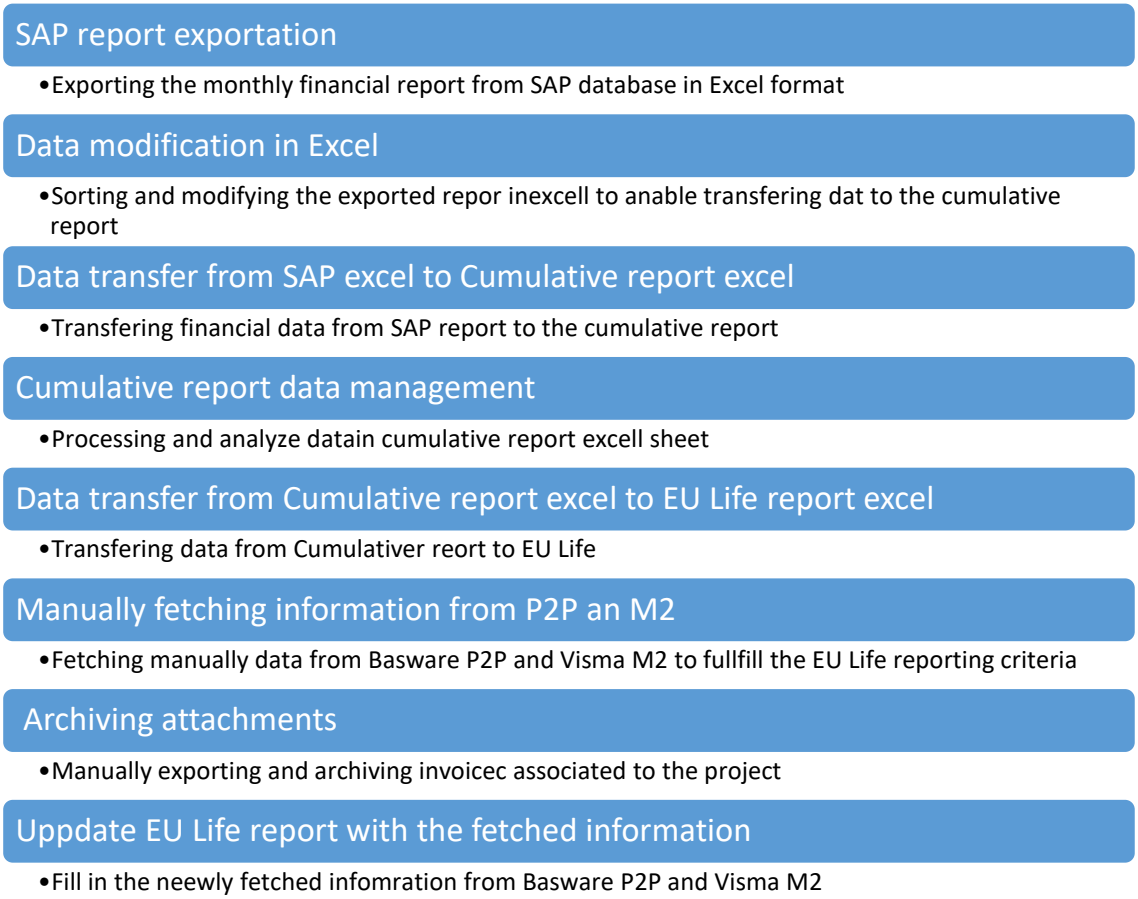

Figure 4 Current processes for updating financial reports

This process starts by exporting the project's SAP report in Excel format. The Excel file is then edited to ensure that the data is in the correct format to be exported into the cumulative report. The data from the SAP report is then exported to the cumulative report, which is further analysed, for example, by updating the pivot tables and checking the quality of the data. Finally, the data is transferred from the cumulative report to the EU Life reporting framework.

The most time-consuming steps in the process involve retrieving missing data for the EU Life report and archiving attachments. Specifically, the process of obtaining payment dates, comments from attachments in P2P and M2, and translating Finnish comments into English is currently labour-intensive. Additionally, the manual archiving of

attachments requires printing them in PDF format from the P2P and M2 systems and saving them on the H-drive. Finally, the data retrieved from these steps needs to be manually exported to the EU Life report, with each row requiring individual data input.

In addition to the above, the current financial reporting process includes three separate Excel files, all of which are processed manually. There is always a higher risk of error in manual work compared to automated processes. Therefore, the development proposal aims to automate as much as possible using RPA (Robotic Process Automation) and streamline the reporting processes using RPA. The development proposal has reduced the number of steps to five, of which two are automated by RPA and only three require manual work.

Figure 5 below illustrates the steps of the development proposal. The work steps marked in blue are manual and the work steps marked in orange are automated using RPA.

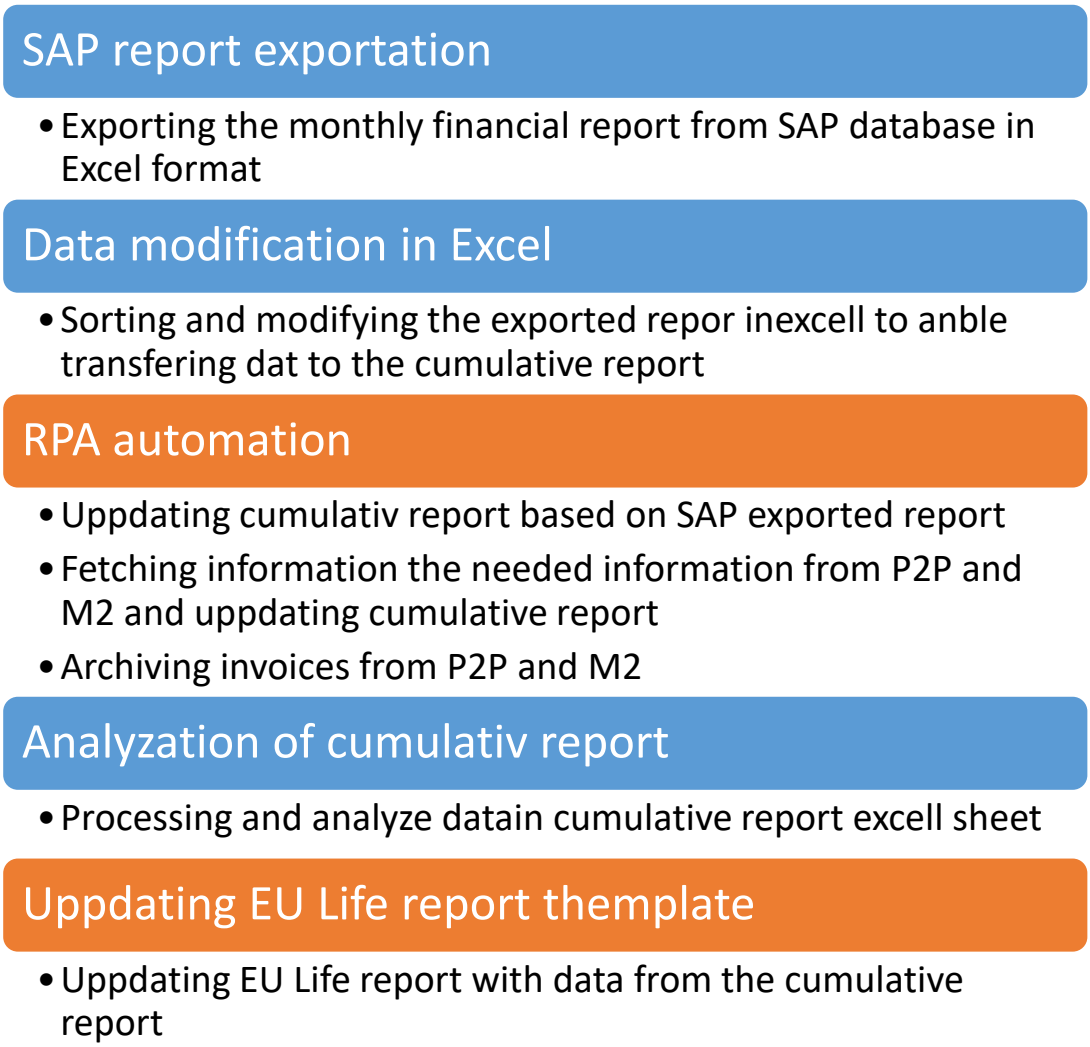

Figure 5 Development idea for updating financial reports

The first two stages of the development proposal remain the same as in the current system. First, the SAP reports are generated, and then the Excel files are edited to ensure that the files are in the same format as the cumulative report. After this, RPA is activated, which automatically updates the cumulative report base based on the SAP Excel data. At the same time, RPA retrieves the necessary additional data from P2P and M2 systems that were previously retrieved manually. In addition, RPA saves all attachments and archives them on H-disk.

As the RPA retrieves data that was previously entered directly into the EU Life report, the cumulative report must be developed to include all the information needed to create an EU Life report. Once the RPA has updated the cumulative report, the next step is to analyse the report and translate the comments into English if the comments are written in Finnish. The final step is to update the EU Life report, which is done with RPA.

4.4.2 Overproduction waste in filling in the EU Life form

In the current process, the EU Life reporting framework undergoes unnecessary updates every month or every two months, despite the fact that the EU Life report is only sent to the EU Life controller once or twice a year, just before the payment period ends. This monthly update represents the first Lean management Muda, the waste of overproduction, which contradicts the principles of Lean management. The root cause behind these frequent updates is the manual gathering of information from P2P and M2 software, including payment dates and attachment archiving.

To streamline the process and eliminate the waste of overproduction, a more efficient approach is needed. One solution is to develop a cumulative report that encompasses all the required information for EU Life reporting. By including all necessary data in the cumulative report, there will be no need to complete the EU LIFE report separately each month.

4.4.3 Improving the quality of time sheets and billing data

In the current process, another type of Muda, known as "wastage due to defective parts," comes to light in the reporting process, where errors are most commonly associated with hourly entries or accounting mistakes. Correcting these errors does not add any value to the process, and the time spent rectifying them is wasted due to faulty parts.

To address this issue, the cornerstone of lean management, Kaizen, along with proper training and support, can play a vital role. One potential improvement idea to enhance the quality of hourly entries and invoicing data involves standardizing and thoroughly documenting the procedures for conducting hourly entries and invoicing. During each project kick-off meeting, these documents and standards should be carefully reviewed to ensure that all team members have seen and comprehended the correct procedures. If any recording errors are identified, they should be promptly discussed with the relevant personnel, and together, strategies should be devised to ensure that future recordings adhere to the established standards.

5 Conclusion and discussion

5.1 Conclusion

This master study objective was to study the project financial reporting process and to evaluate how and if it is possible to develop the process. Although the financial reporting team is reporting multiple styles of externally funded projects, this master thesis was limited to EU Life-funded project reporting. The study focused on the current state and the current EU Life reporting template.

The central research question of this study was “How to develop a leaner financial reporting process?" To address this, the study delved into the theoretical framework of Lean Management and RPA. The study's findings suggest that RPA can effectively address the different types of waste categorized in the Lean methodology, thus streamlining operations and freeing up valuable human resources for more complex and creative tasks. One of the examples of RPA’s ability to streamline processes is described in Chapter 4.4.1 Manual labour updating the financial reporting where the financial reporting updating was reduced from 8 manual steps to 3 manual steps and 2 steps completed by RPA.

The research had three sub-research questions which supported the main research question

- Which parts of the reporting process can benefit from Robotic Process Automation (RPA) to streamline the process?
- What aspects of the process add value to the financial reporting?
- Which parts of the process are non-value-adding tasks?

In response to the first sub-research question, "Which parts of the reporting process can benefit from Robotic Process Automation (RPA) to streamline the process?" the study has revealed that RPA is great for handling routine and repetitive tasks that are manual.

The case study identified the updating of the financial report and the archiving of invoices as the most advantageous stages for RPA integration.

The utilization of RPA in these areas has shown to be particularly effective. By automating the updating of financial reports, RPA can reduce the time and effort traditionally required to manually consolidate and input data. Similarly, for invoice archiving, RPA has proved to be valuable in the systematic storage and organization of invoices without any human intervention. The main findings of this thesis indicate that RPA can effectively reduce manual workload by automating various tasks. This means that the use of RPA can significantly decrease the amount of manual work required. This not only streamlines the process but also allows the financial reporting team to redirect their focus towards more analytical and strategic responsibilities.

In addressing the second sub-question, "What aspects of the process add value to the financial reporting?" it's evident that the entire financial reporting process inherently adds value. The final report is the key product that delivers this value to the customer. However, certain steps within the process contribute more value than others.

One such value-adding activity is the accurate recording of project operational data which includes time sheets and billing data. When the operational team provides correct financial data, the workload for the financial reporting team is substantially reduced, resulting in a more efficient process. Entering accurate initial data reduces the need for future corrections, enabling a more streamlined process for generating financial reports. Therefore it´s important to ensure good quality data from the operational team.

Another critical step that adds value is the analysis of the financial report. By identifying and correcting errors before submission, we enhance value for the end customer. This proactive approach minimizes the likelihood of follow-up questions from financiers, streamlines the approval process, and ensures that the report accurately reflects the project's financial status.

Addressing the last sub-question, "Which parts of the process are non-value-adding tasks?" the study identified two steps that did not contribute value to the end customer. The first non-value-adding activity was the correction of errors in timesheets submitted by project team members. Due to inconsistencies in the quality of data entry, the financial reporting team had to invest significant time to revise these inaccuracies. This task, while necessary for accurate financial reporting, does not contribute more value for the customer but instead diverts resources away from strategic financial analysis. The approach to eliminating the non-value-adding task was to produce a standardised document to the operation team that is communicated in every project opening meeting how the time sheets and billing data should be updated.

Another step identified as non-value-adding was the manual archiving of each invoice into a separate database. Although this step was crucial for compliance with the documentation standards required by EU Life-funded projects, it was labour-intensive and did not contribute directly to the financial reports. The invoice software's limitations necessitated this additional manual process, indicating a need for system improvement or integration to reduce the manual workload. To eliminate this non-value-adding step RPA was highlighted as a solution by automating this data transfer with RPA software.

5.2 Discussion

The results of this case study have practical implications for the case company's financial reporting processes. Although these processes are specifically tailored to the case company, limiting direct applicability to other entities, organizations managing EU Life-funded projects, or those with similar externally funded initiatives requiring diligent financial reporting, may still gain substantial insights. By harnessing Lean Management and RPA, this research offers pragmatic strategies to support both the efficiency and precision of financial reporting tasks. A challenge for the case company is to determine the

extent to which they can develop RPA processes internally and determine when to enlist external assistance to construct a robust RPA system.

This study gives a new insight by investigating the integration of Robotic Process Automation (RPA) with project-based financial reporting. The inherent challenges of this reporting framework is its need to accommodate multiple standard forms required by various stakeholders. Consequently, no single RPA solution can adapt to all reporting needs, suggesting a necessity for multiple, specialized RPAs tailored to each form. Future research could explore the feasibility of implementing RPA within smaller teams, where one challenge is the limited budget that is available towards hiring external consultants. Instead, these teams must possess the capability to develop and adapt their own RPA solutions internally.

To ensure the credibility and accuracy of the study, it is essential to evaluate both the validity and reliability of the findings. Validity refers to the extent to which the study measures what it is intended to measure and whether it is an accurate representation of the phenomenon under investigation. Reliability refers to the consistency and stability of the study or measurement over time and across different settings. The research questions were clearly stated, and the methods used to collect and analyse data were described in detail. The research questions were answered and the result of the study achieved a practical suggestion for how the financial reporting could be improved. Therefore, the study has taken measures to ensure validity and reliability.

All studies have limitations, and this study's limitation is the small selected group of participants from only one organization. Future research could enhance the robustness of these findings by expanding the sample size across multiple organizations. Such studies could provide a more comprehensive validation of the proposed process that is using RPA.

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6 Appendixes

Appendix 1 The interview question

- Do you have a specific area of expertise?

- Could you explain the main steps of your financial reporting process? (Only the major ones are sufficient.)

- What are the biggest challenges in the current process? What causes them?

- Which 3 tasks take up the most time in the project financial reporting process?

- Are there tasks in your job that require information/permission/guidance from a colleague before you can start your part?
  - Who do you reach out to if you need confirmation or additional information?
  - Who has the decision-making authority if problems/challenges arise?

- Are there steps in the process where you send the same data to multiple files?

- At which stages do most errors occur?
    - When are the errors detected?
    - How can the error be corrected?

Appendix 2, Current VSM